Lake Whatcom Transportation Assessment

4/08/2002

This assessment addresses issues affecting the DNR road network. It covers maintenance needs, existing and needed easements, and gates. The Lookout Mountain access comparison has also been combined into this assessment.

1. Current Status of Road Network

To do a thorough assessment of the transportation network, a complete inventory of roads on DNR land was needed. Road data was updated for all known active, abandoned, and orphaned roads. These three categories come from forest practices law. An orphaned road is legally defined as a road or railroad grade that has not been used since 1974. Abandoned status is only given to those roads that gain forest practices approval after natural drainage has been restored and vehicle access is blocked. Any other road is considered active. There was formerly an "inactive" status that has been dropped in the latest revision of the laws. Map Q-1 has been included with this assessment that shows the location of the roads in each category, and the following table shows the length in each category on DNR ownership.

Status	**Length (miles)**
Active	47.3
Abandoned	9.9
Orphaned	39.9
Railroad (Active)	0.3
Total	97.4

Active Roads

After Watershed Analysis was completed for Lake Whatcom, there have been many upgrades to the active roads. The Lookout Mountain, Squalicum View, and Parkside timber sales all included culvert replacements and the addition of rock surfacing to the roads serving those sales. Work was also done on the roads serving the powerline on the north side of the lake. Four-wheel drive access has been sharply reduced on this road system, which has helped maintenance problems.

Lookout Mountain

Much work has also been done on the Lookout Mountain mainline. This road was built in the early part of the century using poor construction methods. This has left a road that provides many challenges. Sliver fills were removed along the triple switchback section this summer. A light layer of surfacing rock was added, new culverts were installed, and ditch improvements were completed on the rest of the road system. It still has many problems. There are culverts that are too small and places that have no ditch. Creating new ditches has been difficult because it usually requires blasting away solid sandstone. There is at least one stream crossing that was built using a fill of logs and other organic material. The layer of surfacing rock is adequate for passenger vehicles but would not sustain heavy truck traffic. Any maintenance on this road is

complicated by the power cable buried in the road. The location and depth of the cable are inconsistent, so contractors frequently damage it.

The Lookout Mountain mainline also receives more traffic than any other road system. Except during the winter months, there are approximately ten vehicles per week visiting the communication sites. When special projects are occurring at these sites, there can be more than ten vehicles per day.

Olsen Creek
Another problem area has been the Olsen Creek mainline. There are several cutbanks that continually slump into the ditch. This problem is currently addressed with frequent monitoring and maintenance.

This is also the location of the only DNR bridge in the watershed, crossing Olsen Creek. The latest inspection rated it adequate for commercial haul.

Sultan Hill
Surfacing rock will be needed if log or rock haul occur on the Sultan Hill mainline at the top of Stewart Mountain. Crown Pacific has improved the portion of this road on their ownership. Their trucks currently use routes to pavement that are outside the watershed, but they do have easement for use of our road.

Cub Creek
A recent DNR assessment of culverts found only one pipe in the watershed that requires replacement for fish blockage. It is located at the top of Haner Mountain. No fish have been seen in the stream that flows through the culvert, but the stream meets the criteria for supporting resident fish.

Blue Mountain
This road system is in good condition. The greatest need is for the addition of surfacing rock. There are many unique drainage structures, such as “trash racks” and energy dissipators, which increase the maintenance costs. Trash racks are used to stop wood that is moving downstream before it blocks the culvert entrance.

Mirror Lake
This road system is in good condition. No significant maintenance is needed on the active roads.

Some useful rock sources have been found in this area. Rock from the “Doc Spratley” pit, just outside the watershed boundary, has recently stopped producing quality rock and will undergo reclamation soon. The “Doc Watson” pit is within the watershed. It hasn’t been used for many years but could provide good rock in the future.

Abandoned Roads
Most of the roads that have been designated as abandoned were small spurs that were used to access individual harvest units. There are two cases in which orphaned roads were still accessible enough to allow abandonment work to be done.

Orphaned Roads
Aerial photos dating from 1943 to 1995 were reviewed to find road and rail grades used for early logging operations. Most of the grades were located in the Smith and Olsen Creek basins. Several large fills failed on grades in the Smith Creek drainage during the 1983 storm event in Lake Whatcom. Due to these failures and the vegetation growing along the grades, it is often difficult to walk them, let alone provide access for vehicles. Getting equipment into these areas would require building new road around the failures. For this reason, any work would need to be done either by hand or using explosives.

2. Easements

The existing easements that DNR has either granted or acquired are summarized on the table on page Q-6. These easements are also shown on Map Q-2. Except where indicated, the easements are permanent. Traditionally, maintenance is paid for in proportion to each party's use of the road. For example, DNR (or its contractors) will pay for maintenance on any roads used for timber haul. If another landowner is also using that road, the costs will be shared.

In addition to granted or acquired easements, Map Q-2 also shows potential easement acquisitions. They are private roads that appear to be worth considering for timber haul access. Since this assessment was completed prior to completion of the landscape plan, these should be used to generate discussion for planning rather than to suggest required action.

Lookout Mountain Powerline
During research into existing easements, special attention was paid to which easements granted rights for other parties to bury cable under the Lookout Mountain mainline. Documents indicate that the original cable was placed by BPA in the late sixties. An agreement between BPA and Puget Sound Power & Light in 1970 appears to have assigned BPA's easement rights to allow for a second cable to be installed. These cables travel from Lake Louise Road to the northern communication site. The land that the towers are built on is owned by the "United States of America" and is used by BPA and their lessees. Ownership of the road at that time included Leila June Olsen, the Corning family, Georgia Pacific, DNR, and Scott Paper.

The southerly communication site was established around 1988. It belonged to Georgia Pacific but is now owned by DNR. The power cable to service this site is buried under the LM-2400 road and connects with the BPA or PSP&L cable.

It is interesting to note that in both easements involving DNR, we granted road access but no mention is made of burying a power cable. No additional agreements were found at the Whatcom County auditor's office. RCWs 79.01.384 and 79.01.388 provide the terms required for utility companies to bury lines on state lands. The requirements were likely met when the utility

companies applied for road right-of-way. It may have then been considered unnecessary to mention cable right-of-way since it is granted by state law. Those RCWs are listed below:

RCW 79.01.384
Right of way for utility pipe lines, transmission lines, etc.
A right of way through, over, and across any state lands or state forest lands, may be granted to any municipal or private corporation, company, association, individual, or the United States of America, constructing or proposing to construct, or which has heretofore constructed, any telephone line, ditch, flume, or pipe line for the domestic water supply of any municipal corporation or transmission line for the purpose of generating or transmitting electricity for light, heat, or power.

RCW 79.01.388
Right of way for utility pipe lines, transmission lines, etc. -- Procedure to acquire.
In order to obtain the benefits of the grant made in RCW 79.01.384, the municipal or private corporation or company, association, individual, or the United States of America, constructing or proposing to construct, or which has heretofore constructed, such telephone line, ditch, flume, pipe line or transmission line, shall file, with the commissioner of public lands, a map, accompanied by the field notes of the survey and location of such telephone line, ditch, flume, pipe line or transmission line, and shall make payment therefor as provided in RCW 79.01.392. The land within the right of way shall be limited to an amount necessary for the construction of said telephone line, ditch, flume, pipe line or transmission line sufficient for the purposes required, together with sufficient land on either side thereof for ingress and egress to maintain and repair the same, and the grant shall include the right to cut all standing timber, and/or reproduction within said right of way. The grant shall also include the right to cut trees marked as danger trees by the applicant outside of the right of way, which shall be dangerous to the operation and maintenance of the telephone line, ditch, flume, pipe line or transmission line upon full payment of the appraised value thereof.

The following list contains all the easements related to the powerlines on the Lookout Mountain road system. The date, parties involved, rights granted, and road maintenance responsibilities are summarized for each agreement:

Sept 17, 1965; USA & Scott Paper
Allows: 1) Right to clear and keep clear any trees within the beam path. 2) Right of way for the construction, operation and maintenance of a road approx. sixteen feet in width (with additional widths necessary for cuts, fills and turnouts and for curves) for clearing trees and brush, grade, level, cut, fill, drain, build, surface, maintain, repair and rebuild a road and such culverts, bridges, turnouts, retaining walls, or other appurtenant structures as may be necessary; and the right to use said road. 3) Right to bury and maintain an underground power cable within sixteen foot right of way.
Road maintenance: If the road is damaged by the USA or its agents, the USA will repair the damage.

Oct 7, 1965; USA & Corning family
Allows: 1)"Right to clear timber, brush, grade, level, cut, fill, drain, surface, maintain, repair and rebuild an existing road and such culverts, bridges, turnouts, retaining walls, or other appurtenant structures as may be necessary; and the right to use said road on, over, and across the land embraced within the right of way." 2) "Right to bury and maintain an underground power cable within said 16 feet right of way."
Road Maintenance: If the road is damaged by the USA or its agents, the USA will repair the damage.

April 12, 1966; USA & Georgia Pacific
Allows: 1) Right to clear and keep clear any trees within the beam path. 2) Right to construct and maintain a parking area near the tower and 3) Right of way for the construction, operation and maintenance of a road approx. sixteen feet in width (with additional widths necessary for cuts, fills and turnouts and for curves) for clearing trees and brush, grade, level, cut, fill, drain, build, surface, maintain, repair and rebuild a road and such culverts, bridges, turnouts, retaining walls, or other appurtenant structures as may be necessary; and the right to use said road. 4) Right to construct, operate and maintain an underground or overhead power cable from approximate survey stations 60+70 to 97+12 and across the switchbacks near the south line of said section 7.
Road maintenance: If the road is damaged by the USA or its agents, the USA will repair the damage.

Dec 1, 1966; USA & DNR
Allows: Road use necessary for microwave radio station construction, operation, and maintenance.
Road maintenance: Must enter into a road maintenance agreement, which will assign costs based on proportional share of use.

May 28, 1970; USA & Puget Sound Power and Light
Allows: Installation and maintenance of an underground electric service line along the road within the USA easement area.

Road maintenance: Puget Sound Power and Light are assigned rights based on BPA's easement, so they would be subject to BPA's maintenance requirements.

March 31, 1988; US West & DNR
Allows: "Administrative access to an electronic site."
Road maintenance: Each party pays a "pro rata share" of the costs.
Note: This agreement expired in 1997. Road use is now addressed in the communication site lease.

April 1, 1988; US West & Georgia Pacific
Allows: 1) Ingress, egress, and installation and maintenance of utility wires, cables, conduits, and pipes over, under, or along a twenty foot wide right-of-way. 2) Tower construction and use.
Road maintenance: A May 3, 1988 addendum states that costs are to be allocated based on respective use of the road.
Note: This agreement expired in 1993 but included an option to renew four more five year terms with the same agreement.

In addition to their easements, all users of the Lookout Mountain mainline system have entered into a road maintenance agreement. This agreement was created after disagreements about maintenance responsibility occurred in 1996. It contains the following commitments:

- All parties will meet annually to review maintenance needs.
- Routine maintenance costs are divided equally among all parties.
- Damage beyond normal use is repaired by the party causing the damage.
- Roads used for timber haul are maintained by the party hauling the timber.
- Emergency repairs are done by DNR, BPA or Puget Sound Energy. The costs of these repairs will be distributed evenly among all parties afterward.
- DNR will review proposals for all non-emergency work.
- All work shall meet the requirements of the Washington State Forest Practices Act.

Easement Number	Grantor	Grantee	Date	Road Maintained By	General Comments
T36N R4E					
Exch. 490	Bloedel Timberlands Development, Inc	Department of Natural Resources	31-Oct-97	User	Included in land exchange.
T37N R3E					
688	Robert L. Karl and Fannie L. Karl	Telecable INC	01-Jun-68	Not Assigned	Expired in 1993.
2230	Bloedel Timberlands Development Inc.	Whatcom County (Park Board)	03-Nov-69	Grantee	Granted to access rifle range.
2458	Department of Natural Resources	Crown Pacific Ltd	15-Sep-89	User	Permanent Easement Exchange
27911	Department of Natural Resources	Department of Natural Resources	20-Dec-62	Not Assigned	Same as 30666 - Galbraith Mountain Radio Tower Site
30666	Department of Natural Resources	Department of Natural Resources	20-Dec-62	Not Assigned	Same as 27911 - Galbraith Mountain Radio Tower Site
T37N R4E					
834	Scott Paper Company	Department of Natural Resources	07-Feb-73	User	Same as 34305
2458	Department of Natural Resources	Trillium Corporation	24-Jun-93	User	Easement Exchange
30825	Department of Natural Resources	Bonneville Power Admin.	01-Dec-65	Grantor	BPA must participate in maint agreement, pay proportional amount.
34305	Department of Natural Resources	Scott Paper Company	07-Feb-73	User	Same as 834
36288	Department of Natural Resources	Bonneville Power Admin.	09-Apr-73	User	
49290	Department of Natural Resources	U.S. West NewVector	31-Mar-88	User	Expired March 31, 1997
53177	Trillium Corporation	Department of Natural Resources	24-Jun-93	User	
53563	GP, Scott, Corning	United States of America	17-Sep-65	User	Permanent. Lookout Mountain Radio Tower

53564	Bonneville Power Admin.	Puget Sound Power and Light	28-May-70	N/A	BPA approval for burying the power line in the road.
53580	Crown Pacific	Trillium Corporation	15-Sep-89	User	
53581	Three Rivers Timber Company	Crown Pacific	03-Jul-89	Grantor	
53604	Georgia-Pacific Corporation	Trillium Corporation	13-Jul-88	Not Assigned	Land sale. Seller retained rights to portions of the roads.
53610	Georgia-Pacific Corporation, et al	United States of America	11-Nov-76	User	Powerlines and access.
53627	Paul R. Gilfilen & Leona E. Gilfilen	H.W. Anderson & Grace A. Anderson + Ernst Miller	06-Oct-44	Not Assigned	Land sale. Seller retained rights to portions of the roads.
54297	Department of Natural Resources	Nielsen Bros	-	-	RUP Expired Dec 31, 1995
70445	Department of Natural Resources	Crown Pacific	01-Jun-98	User	
Exch. 490	Bloedel Timberlands Development, Inc	Department of Natural Resources	31-Oct-97	User	Included in land exchange.

T38N R4E

2644	Leila June Olsen Estate	Department of Natural Resource	25-Sep-96	User	
53580	Crown Pacific	Trillium Corporation	15-Sep-89	User	
53604	Georgia-Pacific Corporation	Trillium Corporation	13-Jul-88	Not Assigned	Land sale. Seller retained rights to portions of the roads.
55387	Department of Natural Resources	Crown Pacific	02-Mar-98	User	Easement Exchange. Same as 2645.

3. Gates

The following table provides a list of the gates that access DNR roads within the watershed. The "control" column identifies what party maintains the gate and access through it. This is usually, but not always, the landowner at the location of the gate. The "public" column identifies whether a government entity could allow public access through the gate. Many gates that the DNR controls could be opened to public use, but some gates are restricted by the easement agreements along that road. The "purpose" column shows the primary reason why DNR has chosen to keep a locked gate at that site. A map is available that shows the location of each of these gates.

	Gate	Control	Public	Purpose
1.	Y Road	Crown Pacific	No	-
2.	Olsen Creek	John Hancock	No	-
3.	North Shore	Whatcom Co. Parks	Yes	Protect powerlines, limit sediment
4.	Upper North Shore	DNR	Yes	Protect powerlines, limit sediment
5.	Haner Mt.	DNR	No	Protect powerlines, limit sediment
6.	Park Rd.	DNR	Yes	Limit road damage/sediment
7.	June Olsen	DNR	Yes	Protect communication sites, limit road damage/sediment
8.	Lake Louise	Trillium	No	-
9.	TCI/Repeater Road	DNR	Yes	Protect communication site, limit road damage/sediment
10.	Manley Road	Trillium	No	-
11.	Upper Rifle Range	Bloedel	No	-
12.	Mirror Lake	DNR	No	Required by easement
13.	Wildwood	Private	No	-
14.	Galbraith	Bloedel	No	-
15.	Alger Mt.	DNR	Yes	Reduce vandalism (usually remains open)

4. Lookout Mountain Route Options

The existing access into what are now DNR lands in the Lake Whatcom watershed was established when the land was first logged early in the 1900s. Most of those roads are still acceptable by today's standards, but the access road onto Lookout Mountain has caused some concern. Its location near streams and unstable slopes requires improvements be made to surfacing and drainage. If log trucks use the road in the future, there will need to be even more extensive work done. Before DNR commits to this investment, it is important to first determine if there is a better option. Since there is a power cable buried below the road, the road must be kept active for cable access, but the long-term costs might be lower if most traffic used another route. Five alternatives were considered. They are shown on Map Q-2. The advantages and disadvantages associated with each are described below.

The goal of this comparison is not to determine the "best" route because that decision depends on the strategies and objectives that will be formed after the assessment stage. This work will help determine whether it is reasonable to consider each route and possibly help identify planning objectives.

Also, no attempt was made to try to calculate economic costs of the construction and reconstruction for any route. The amount of work required is very site specific and conditions on Lookout Mountain vary from easy construction to very difficult within short distances. With the length of road being considered, it would take a tremendous amount of time to fully assess the

site specific needs for each route. Without this detailed work, estimates would have so much potential error that dollar figures would be misleading.

Lake Louise Rd.
This is the existing access onto Lookout Mountain, described above. It connects to Lake Louise Road, and trucks must travel to I-5 via Lakeway Blvd because there is a bridge with a weight limit on Lake Whatcom Blvd to the east.

Unstable Slopes –
- Passes through ARS 4 in several locations. Recent maintenance has reduced the risk of sidecast material failing, but there is still a risk of drainage being misdirected onto unstable slopes because of the raveling cutbanks, lack of ditches, and meager surfacing. This road will need extensive upgrading to safely manage water flow.
- The problems to be solved with this route are visible since this is an existing road grade. Constructing in a new location brings some uncertainty of what conditions exist under the surface.

Streams –
- Runs parallel to several type 4 streams. This makes it more difficult to keep sediment from the road surface from entering streams.

Tribal –
- This road had recent cultural use before the gate was placed near Lake Louise Road in the early 1990s. There may be site specific concerns about reconstruction.

Traffic –
- Traffic passes behind Sudden Valley homes. Trucks also pass through populated areas of Geneva and Lakeway Drive.

Economics –
- The haul distance is the longest for both log and rock haul.
- Provides entirely downhill haul for log trucks.

Power Cable –
- The power cable buried under the road surface. At a minimum, this road will have work done to create a suitable service road.

Wildwood
This road would connect with Lake Whatcom Blvd near the Wildwood resort on the south end of the lake. It would involve extending a recently constructed private road to the DNR

"TCI/Repeater Road." In order for this road to access the entire Lookout Mountain block, a connection would have to be constructed between the TCI Road and the upper portion of the Lookout Mountain mainline.

Slope Stability –

- Runs near and through ARS 4 in two locations. The first crossing was at a site that seemed reasonably stable, and another portion crossed headwalls of the streams that flow under Lake Whatcom Blvd. Correctly placing culverts would be critical.

Economics –

- Rough estimates indicate a 30' cut at centerline on a 45% slope for one switchback. This would result in a face greater than 45 feet high. Somewhat less extreme cuts will be necessary for other switchbacks.
- Most of the road that would be constructed wouldn't improve harvest access. Other routes improve access and lower harvest costs in some way, or portions would be needed regardless of the route chosen.

Tribal –

- Tribal history tells of an ancient battlefield located somewhere in this vicinity.

Neighbors –

- Visible from most of south Lake Whatcom. The extensive excavation would create unattractive faces.
- No residential areas would be affected by truck traffic.

Camp 2 Rd.

This route connects to the Camp 2 road near Cain Lake. It would extend an existing DNR road up a ridgeline to connect with Trillium's road system and continue north onto DNR ownership. One variation of this route was dropped several years ago in early stages of planning because of an unstable channel above the Glenhaven community. The alternative presently being considered would avoid the unstable area by passing on the west side of the ridge.

Economics –

- The steep grades required (up to 20%) have a somewhat higher maintenance cost. Truck tires tend to spin and damage the surface more than on flat roads; and water flowing on the road surface causes more erosion.
- The ridgetop location would contribute to lower construction costs and lower maintenance costs because less water is present at the top of a ridge than midslope locations.

Ownership –

- Ownership of about 200 feet of the road near its intersection with Camp 2 road is in question. A DNR land survey is scheduled to determine actual property boundaries but won't be complete until 2002.

Traffic –

- The junction of Camp 2 Rd and Cain Lake Rd is too sharp for trucks to safely turn toward I-5. The intersection would need to be improved. This would involve purchasing an easement and moving a utility pole. Since it is a county road, Whatcom County public works would probably need to do this.
- Cain Lake/Glenhaven residents worry about noise from this route. Some background noise might occur from trucks traveling down the grade. The greatest impact would obviously be to the homes along Camp 2 Road.

Other –

- This route involves a long stretch of new construction, but much of this length would be necessary in the future if traditional cable harvest occurred on this hill.

Barnes Creek

This is an existing road, owned by Trillium, that climbs the west side of Lookout Mountain. Rebuilding about 500 feet of abandoned road would tie into the DNR road system. There are two options for intersecting with county roads. Trillium's road currently connects with Manley Road, but the last mile or so of their road has high maintenance costs. Cutbanks slump into the ditch each winter, and the ditch drains into an incised stream channel (similar to ARS 4). With about ½ mile of new construction, this section could be avoided by connecting with Squires Lake Road to the south.

Economics –

- For the most part, this route uses existing roads.
- There are numerous sharp switchbacks on steep ground. Increasing the radius of three of them may be nearly impossible, and several others would be expensive to improve.
- Close to rock sources in Skagit County.
- There would be a long uphill haul for log trucks. It wouldn't be a big impact for harvests on the top of the mountain, but areas around the TCI Repeater Rd and near the Austin Flats timber sale would have increased haul cost.
- Squires Lake Road would probably need improvements.

Slope Stability –

- One switchback on the Manley Road option drains into a steep gorge that would probably be classified ARS 4 if it was inside the watershed. This stream crosses under Manley Road and I-5.
- Cutbank failures are frequent on the lower portion of the existing road. Bypassing this area via Squires Lake Rd. would be highly desirable. Retaining walls might be another option that would improve the situation.

Rifle Range
This access would connect to the public road system near the North Lake Samish exit on I-5. It would use the paved road to the Plantation Rifle Range and Bloedel's haul road in the Lake Creek drainage. Construction would be required on Bloedel and Trillium land to connect with DNR's road system near the top of Lookout Mountain.

Neighbors –

- Log and rock trucks wouldn't pass any homes. They would use the Plantation Rifle Range access road, but the facility is usually not used during work hours. Whatcom County Parks aquired this access on an existing logging road. Bloedel and Trillium still heavily use this road.
- Easements would be needed from multiple landowners: the City of Bellingham, Whatcom County Parks, and Bloedel Timber.
- The last 500 feet of new construction at the top of the mountain would create a face visible from I–5.

Slope Stability –

- No ARS's would be crossed by new construction. Slopes greater than 70% would be crossed.
- The existing road above the rifle range didn't appear to have any serious maintenance problems.

Other –

- Bloedel harvests would benefit from this road location. Some variation of it would likely be built if they harvest the upper portion of their ownership.

Summary of the Route Options
Only one of the options seems to be unworthy of consideration in further planning. The Wildwood access had strong negatives in slope stability, visibility, economics, and tribal categories. The Manley Road connection is also less desirable than the others, though solutions to the maintenance problems at the bottom could be designed. Bypassing this area via Squires Lake Road is worth considering.

Further information about the alternatives is shown in the table below. The Barnes Creek route is shown separately for the Manley Road and Squires Lake options. All information presented here is approximate. Care should be taken in applying these numbers. For example, construction and reconstruction costs can vary widely, depending on the work necessary. So the lengths shown cannot be used to interpret relative costs of the routes.

	Construction (feet)	Reconst. (feet)	ARS 4 Length (feet)	Major Stream Crossings	Adverse Haul	Haul Dist (to Alger Exit in miles)	Est. Haul Time (minutes)
Lake Louise	0	15,900	1,500	4	None	21	40
Wildwood	~12,000	4,000	3,200	6	None	10	30
Camp 2	5,300	5,000	200	1	Med	9	30
Manley Rd	500	20,000	400	3	Med	8	25
Squires Lk	2,300	16,000	400	3	Med	8	25
Rifle Range	5,400	7,000	1,100	5	High	12	30

	Switchbacks < 50' radius	Maintenance Trouble	Traffic Impact	Noise Impact	Visual Impact	Known Tribal Concerns
Lake Louise	3	High	Sudden Valley/Lakeway	High	Med	Med
Wildwood	5	Med?	Lake Whatcom Blvd	Med?	High	High
Camp 2	2	Med	Glenhaven / Cain Lake	High?	Low	Med?

Manley Rd	6	High	Manley Rd	Med	Med	Low
Squires Lk	6	Low	Squires Lake Rd	Med	Med	Low
Rifle Range	0	Low	Rifle Range	Low	Low	Low

Explanation of data:

All data – The Lake Louise and Wildwood routes are assumed to start at the pavement and end at a common point along the Lookout Mainline. This point was assumed to be where the new construction began for the Austin Flats timber sale (about ½ mile above the triple switchbacks). The other routes also start at the pavement and end at the intersection of the existing Lookout Mainline and the LM-2400.

Construction and reconstruction – Construction length for Wildwood was estimated, since the actual location has not been identified. All other lengths are based on GIS data.

ARS 4 Length – Based on GIS data from watershed analysis. 200 feet were added to Manley Road and Squires Lake since they pass through an area similar to ARS 4, but are not in the Lake Whatcom analysis area.

Major Stream Crossings – The number of type 1-4 streams crossed, based on stream data updated for this Landscape Plan.

Adverse Haul – Roads that force log trucks to travel uphill while loaded are considered "adverse". The speed of the trucks will be much slower on an adverse haul. The steeper the grade, the slower the trucks will travel. This rating, however, only rates the length of uphill haul, not the steepness.

Haul Distance and Time– Haul distance was measured from the common points explained in "all data" above and ended at the Alger exit of I-5. Time was calculated using tables based on curve radius, elevation gain/loss, curves per km, road width, and surfacing. These variables were either visually estimated or calculated using GIS data.

Switchbacks < 50 ' Radius – This is a count of existing switchbacks that are less than 50' radius, which is assumed to be the minimum radius that log and rock trucks can safely maneuver.

Maintenance Trouble – This is a subjective rating of how frequent maintenance needs occur on these roads. The Lake Louise and Manley Road ratings are based on existing road problems, Camp 2 is assumed to be somewhat higher because of the steep grade necessary, and Wildwood is based on an approximate location.

Traffic – A general description of the community that truck traffic would pass through.

Noise – This is a subjective rating of how much noise from truck traffic might affect neighbors.

Visual – This is a subjective rating of how visible road construction would be from local homes and highways. It is affected by the distance from the viewer. For example, although the Rifle Range road would be visible from I-5, it would be in the background and less noticeable than the Wildwood road might be to homes on the south end of the lake.

Tribal – Tom Edwards identified roads with known issues. Cain Lake may have historical use by Skagit tribes.

5. Helicopter Yarding

Advantages:

1. Reduced road construction
2. May be used on nearly any terrain
3. Allows flexibility in silvicultural prescriptions and harvest plans
4. Reduced environmental impact because logs are lifted vertically

Disadvantages:

1. High yarding costs
2. Harvest units may be difficult to access for planting and other management
3. Rotor noise is a nuisance to neighbors
4. High production rate may deliver logs faster than a mill can accept

A helicopter is able to deliver 75-200 mbf/day to the landing, depending on the payload capability of the helicopter, the distance to the landing, and the size of the trees. Retaining more trees in thinning harvests will result in slower production. Payloads range from 5,000 to 28,000 lbs.

Landings should be located considering the following factors:

a. reasonable maximum yarding distance = 3300’
b. steepest ascent or descent = 35%
c. flight path should not cross power lines, homes, or public roads
d. 1 acre or more in size